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CLAIMS

What is claimed is:

1. A method, comprising transmitting identification data, location data and environmental state sensor data from a radio frequency tag.

2. The method of claim 1, further comprising depicting a location of the radio frequency tag using a geographic information system.

3. The method of claim 1, wherein the radio frequency tag adjusts, with regard to the environmental state sensor data, a set point to lower power consumption.

4. The method of claim 1, wherein the radio frequency tag can be switched to a transceiver mode that permits tag to tag communication.

5. The method of claim 4, wherein transceiver mode includes the radio frequency tag transmitting during a randomized transmission interval and then receiving and buffering.

6. The method of claim 4, wherein the radio frequency tag is switched to the transceiver mode when an alarm state is activated.

7. The method of claim 1, wherein the radio frequency tag includes a power source including an energy storage device that is recharged by at least one current source selected from the group consisting of a photovoltaic, a vibrational transducer, an electrostatic charger, a radio frequency power rectifier, a thermo-electric generator and a radioisotope decay energy recovery device.

8. The method of claim 1, further comprising receiving identification data, location data and environmental state sensor data from the radio frequency tag at a reader.

9. The method of claim 8, wherein the radio frequency tag can be switched to a transceiver mode that permits tag to tag communication.

10. The method of claim 9, wherein transceiver mode includes the radio frequency tag transmitting during a randomized transmission interval and then receiving and buffering.

11. The method of claim 9, wherein the radio frequency tag is switched to a tag to tag mode when the radio frequency tag does not receive a response from the reader

12. The method of claim 9, wherein the radio frequency tag is switched to the transceiver mode when an alarm state is activated.

13. The method of claim 8, further comprising depicting a location of the radio frequency tag using a geographic information system.

14. The method of claim 1, wherein the radio frequency tag includes a sensor.

15. The method of claim 14, wherein the sensor characterizes at least one member selected from the group consisting of ionizing radiation, chemical moieties, biological species, acoustic emission, mechanical vibration and actinic radiation.

16. The method of claim 14, wherein the sensor characterizes at least one member selected from the group consisting of electromagnetic radiation, humidity, temperature, vibration, acceleration and mechanical interlock.

17. The method of claim 16, wherein the radio frequency tag adjusts, with regard to the sensor, a set point to lower power consumption.

18. The method of claim 1, further comprising a sensor coupled to the radio frequency tag.

19. The method of claim 18, wherein the sensor characterizes at least one member selected from the group consisting of ionizing radiation, chemical moieties, biological species, acoustic emission, mechanical vibration and actinic radiation.

20. The method of claim 18, wherein the sensor characterizes at least one member selected from the group consisting of electromagnetic radiation, humidity, temperature, vibration, acceleration and mechanical interlock.

21. The method of claim 18, wherein the radio frequency tag adjusts, with regard to the sensor, a set point to lower power consumption.

22. The method of claim 18, wherein the sensor includes a power source that is not necessary for the tag to transmit identification data and location data.

23. The apparatus of claim 22, wherein the power source includes an energy storage device that is recharged by at least one current source selected from the group consisting of a photovoltaic, a vibrational transducer, an electrostatic charger, a radio frequency power rectifier, a thermo-electric generator and a radioisotope decay energy recovery device.

24. The method of claim 18, wherein the sensor is coupled to the radio frequency tag wirelessly by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

25. The method of claim 24, wherein identification data, location data and environmental state sensor data from the radio frequency tag is transmitted within a first frequency band and the sensor is coupled to the radio frequency tag wirelessly within a second frequency band that does not overlap the first frequency band.

26. The method of claim 1, further comprising receiving identification data, location data and environmental state sensor data from the radio frequency tag at a reader and re-transmitting

identification data, location data and environmental state sensor data from the reader to a site server that provides data accumulation and analysis.

27. The method of claim 26, further comprising depicting a location of the radio frequency tag using a geographic information system.

28. The method of claim 26 wherein transmitting identification data, location data and environmental state sensor data from the radio frequency tag occurs within a first frequency band and re-transmitting identification data, location data and environmental state sensor data from the reader to the site server occurs within a second frequency band that does not overlap the first frequency band.

29. The method of claim 26, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server can include wireless transmission by at least two alternatives selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

30. The method of claim 26, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes transmission on a reader power supply line

31. The method of claim 30, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes transmission by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

32. The method of claim 30, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes rejecting noise at a frequency selected from the group consisting of approximately 50 Hz and approximately 60 Hz and substantially all harmonics thereof and diversifying.

33. The method of claim 26, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes wireless transmission by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

34. The method of claim 33, wherein wireless transmission by hybrid spread-spectrum modulation includes rejecting noise at a frequency selected from the group consisting of approximately 50 Hz and approximately 60 Hz and substantially all harmonics thereof and diversifying.

35. The method of claim 26, further comprising receiving identification data, location data and environmental state sensor data from the reader at the site server and re-transmitting identification data, location data and environmental state sensor data from the site server to at least one server of a common database that provides analysis, comparison and tracking.

36. The method of claim 35, further comprising depicting a location of the radio frequency tag using a geographic information system.

37. The method of claim 35, wherein the common database defines a global database.

38. The method of claim 35, wherein re-transmitting identification data, location data and environmental state sensor data from the site server to the common database can include transmission by at least two alternatives selected from the group consisting of satellite, cellphone, acoustic, power line, telephone line, coaxial line, optical fiber and optical cable.

39. The method of claim 35, wherein re-transmitting identification data, location data and environmental state sensor data from the site server to the common database includes transmission by internet.

40. An apparatus, comprising: a radio frequency tag that transmits identification data, location data and environmental state sensor data.

41. The apparatus of claim 40, wherein the radio frequency tag includes a power source including an energy storage device that is recharged by at least one current source selected from the group consisting of a photovoltaic, a vibrational transducer, an electrostatic charger, a radio frequency power rectifier, a thermo-electric generator and a radioisotope decay energy recovery device.

42. The apparatus of claim 40, wherein the radio frequency tag includes a sensor.

43. The apparatus of claim 42, wherein the sensor characterizes at least one member selected from the group consisting of ionizing radiation, chemical moieties, biological species, acoustic emission, mechanical vibration and actinic radiation.

44. The apparatus of claim 42, wherein the sensor characterizes at least one member selected from the group consisting of electromagnetic radiation, humidity, temperature, vibration, acceleration and mechanical interlock.

45. The apparatus of claim 40, further comprising a sensor coupled to the radio frequency tag.

46. The apparatus of claim 45, wherein the sensor characterizes at least one member selected from the group consisting of ionizing radiation, chemical moieties, biological species, acoustic emission, mechanical vibration and actinic radiation.

47. The apparatus of claim 45, wherein the sensor characterizes at least one member selected from the group consisting of electromagnetic radiation, humidity, temperature, vibration, acceleration and mechanical interlock.

48. The apparatus of claim 45, wherein the sensor includes a power source that is not necessary for the tag to transmit identification data, location data and environmental state data.

49. The apparatus of claim 48, wherein the power source includes an energy storage device that is recharged by at least one current source selected from the group consisting of a photovoltaic, a vibrational transducer, an electrostatic charger, a radio frequency power rectifier, a thermo-electric generator and a radioisotope decay energy recovery device.

50. The apparatus of claim 45, wherein the sensor is coupled to the radio frequency tag wirelessly by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

51. The apparatus of claim 50, wherein identification data, location data and environmental state sensor data from the radio frequency tag is transmitted within a first frequency band and the sensor is coupled to the radio frequency tag wirelessly within a second frequency band that does not overlap the first frequency band.

52. The apparatus of claim 40, wherein the radio frequency tag is coupled to a shipping container.

53. The apparatus of claim 52, wherein environmental state sensor data includes an environmental state inside the shipping container.

54. The apparatus of claim 52, further comprising an antenna coupled to the shipping container.

55. The apparatus of claim 52, wherein the shipping container includes a shipping container power supply and the radio frequency tag can tap into the shipping container power supply.

56. The apparatus of claim 55, wherein the shipping container includes one member selected from the group consisting of a dry box and a reefer.

57. The apparatus of claim 40, further comprising a reader wirelessly coupled to the radio frequency tag, the reader receiving identification data, location data and environmental state sensor data from the radio frequency tag and re-transmitting identification data, location data and environmental state sensor data from the reader to a site server that provides data accumulation and analysis.

58. The apparatus of claim 57, wherein transmitting identification data, location data and environmental state sensor data from the radio frequency tag occurs within a first frequency band and re-transmitting identification data, location data and environmental state sensor data from the reader to the site server occurs within a second frequency band that does not overlap the first frequency band.

59. The apparatus of claim 58, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server can include wireless transmission by at least two alternatives selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

60. The apparatus of claim 57, wherein the reader is electrically coupled to the site server via a reader power supply line and re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes transmission on the reader power supply line

61. The apparatus of claim 60, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes transmission by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

62. The apparatus of claim 60, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes rejecting noise at a

frequency selected from the group consisting of approximately 50 Hz and approximately 60 Hz and substantially all harmonics thereof and diversifying.

63. The apparatus of claim 57, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes wireless transmission by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

64. The apparatus of claim 63, wherein wireless transmission by hybrid spread-spectrum modulation includes rejecting noise at a frequency selected from the group consisting of approximately 50 Hz and approximately 60 Hz and substantially all harmonics thereof and diversifying.

65. The apparatus of claim 57, further comprising a site server wirelessly coupled to the reader, the site server receiving identification data, location data and environmental state sensor data from the reader and re-transmitting identification data, location data and environmental state sensor data from the site server to at least one server of a common database that provides analysis, comparison and tracking.

66. The apparatus of claim 65, wherein the common database defines a global database.

67. The apparatus of claim 65, wherein re-transmitting identification data, location data and environmental state sensor data from the site server to the common database can include transmission by at least two alternatives selected from the group consisting of satellite, cellphone, acoustic, power line, telephone line, coaxial line, optical fiber and optical cable.

68. The apparatus of claim 65, wherein re-transmitting identification data, location data and environmental state sensor data from the site server to the common database includes transmission by internet.

69. A vehicle, comprising the apparatus of claim 40.

70. A port area network, comprising the apparatus of claim 40.

71. A regional area network, comprising the apparatus of claim 40.

72. A national area network, comprising the apparatus of claim 40.

73. A global area network, comprising the apparatus of claim 40.

74. A method, comprising transmitting identification data and location data from a radio frequency tag using hybrid spread-spectrum modulation.

75. The method of claim 74, further comprising depicting a location of the radio frequency tag using a geographic information system.

76. The method of claim 74, further comprising transmitting environmental state sensor data from the radio frequency tag using hybrid spread-spectrum modulation.

77. The method of claim 76, wherein the radio frequency tag adjusts, with regard to the environmental state sensor data, a set point to lower power consumption.

78. The method of claim 74, wherein the radio frequency tag can be switched to a transceiver mode that permits tag to tag communication.

79. The method of claim 78, wherein transceiver mode includes the radio frequency tag transmitting during a randomized transmission interval and then receiving and buffering.

80. The method of claim 78, wherein the radio frequency tag is switched to the transceiver mode when an alarm state is activated.

81. The method of claim 80, wherein the radio frequency tag includes a power source including an energy storage device that is recharged by at least one current source selected

from the group consisting of a photovoltaic, a vibrational transducer, an electrostatic charger, a radio frequency power rectifier, a thermo-electric generator and a radioisotope decay energy recovery device.

82. The method of claim 74, further comprising receiving identification data and location data from the radio frequency tag at a reader.

83. The method of claim 82, wherein the radio frequency tag can be switched to a transceiver mode that permits tag to tag communication.

84. The method of claim 83, wherein transceiver mode includes the radio frequency tag transmitting during a randomized transmission interval and then receiving and buffering.

85. The method of claim 83, wherein the radio frequency tag is switched to a tag to tag mode when the radio frequency tag does not receive a response from the reader

86. The method of claim 83, wherein the radio frequency tag is switched to the transceiver mode when an alarm state is activated.

87. The method of claim 74, further comprising depicting a location of the radio frequency tag using a geographic information system.

88. The method of claim 74, wherein the radio frequency tag includes a sensor.

89. The method of claim 88, wherein the sensor characterizes at least one member selected from the group consisting of ionizing radiation, chemical moieties, biological species, acoustic emission, mechanical vibration and actinic radiation.

90. The method of claim 88, wherein the sensor characterizes at least one member selected from the group consisting of electromagnetic radiation, humidity, temperature, vibration, acceleration and mechanical interlock.

91. The method of claim 90, wherein the radio frequency tag adjusts, with regard to the sensor, a set point to lower power consumption.

92. The method of claim 74, further comprising a sensor coupled to the radio frequency tag.

93. The method of claim 92, wherein the sensor characterizes at least one member selected from the group consisting of ionizing radiation, chemical moieties, biological species, acoustic emission, mechanical vibration and actinic radiation.

94. The method of claim 92, wherein the sensor characterizes at least one member selected from the group consisting of electromagnetic radiation, humidity, temperature, vibration, acceleration and mechanical interlock.

95. The method of claim 92, wherein the radio frequency tag adjusts, with regard to the sensor, a set point to lower power consumption.

96. The method of claim 92, wherein the sensor includes a power source that is not necessary for the tag to transmit identification data and location data.

97. The method of claim 96, wherein the power source includes an energy storage device that is recharged by at least one current source selected from the group consisting of a photovoltaic, a vibrational transducer, an electrostatic charger, a radio frequency power rectifier, a thermo-electric generator and a radioisotope decay energy recovery device.

98. The method of claim 92, wherein the sensor is coupled to the radio frequency tag wirelessly by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

99. The method of claim 98, wherein identification data and location data from the radio frequency tag is transmitted within a first frequency band and the sensor is coupled to the radio

frequency tag wirelessly within a second frequency band that does not overlap the first frequency band.

100. The method of claim 74, further comprising receiving identification data and location data from the radio frequency tag at a reader and re-transmitting identification data and location data from the reader to a site server that provides data accumulation and analysis.

101. The method of claim 100, further comprising depicting a location of the radio frequency tag using a geographic information system.

102. The method of claim 100 wherein transmitting identification data and location data from the radio frequency tag occurs within a first frequency band and re-transmitting identification data and location data from the reader to the site server occurs within a second frequency band that does not overlap the first frequency band.

103. The method of claim 100, wherein re-transmitting identification data and location data from the reader to the site server can include wireless transmission by at least two alternatives selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

104. The method of claim 100, wherein re-transmitting identification data and location data from the reader to the site server includes transmission on a reader power supply line

105. The method of claim 104, wherein re-transmitting identification data and location data from the reader to the site server includes by transmission at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

106. The method of claim 104, wherein re-transmitting identification data and, location data from the reader to the site server includes rejecting noise at a frequency selected from the

group consisting of approximately 50 Hz and approximately 60 Hz and substantially all harmonics thereof and diversifying.

107. The method of claim 100, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes wireless transmission by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

108. The method of claim 107, wherein wireless transmission by hybrid spread-spectrum modulation includes rejecting noise at a frequency selected from the group consisting of approximately 50 Hz and approximately 60 Hz and substantially all harmonics thereof and diversifying.

109. The method of claim 100, further comprising receiving identification data and location data from the reader at the site server and re-transmitting identification data and location data from the site server to at least one server of a common database that provides analysis, comparison and tracking.

110. The method of claim 109, further comprising depicting a location of the radio frequency tag using a geographic information system.

111. The method of claim 109, wherein the common database defines a global database.

112. The method of claim 109, wherein re-transmitting identification data and location data from the site server to the common database can include transmission by at least two alternatives selected from the group consisting of satellite, cellphone, acoustic, power line, telephone line, coaxial line, optical fiber and optical cable.

113. The method of claim 109, wherein re-transmitting identification data, location data and environmental state sensor data from the site server to the common database includes transmission by internet.

114. An apparatus, comprising: a radio frequency tag that transmits both identification data and location data using hybrid spread-spectrum modulation.

115. The apparatus of claim 114, wherein the radio frequency tag includes a power source including an energy storage device that is recharged by at least one current source selected from the group consisting of a photovoltaic, a vibrational transducer, an electrostatic charger, a radio frequency power rectifier, a thermo-electric generator and a radioisotope decay energy recovery device.

116. The apparatus of claim 114, wherein the radio frequency tag transmits environmental state data using hybrid spread-spectrum modulation.

117. The apparatus of claim 116, wherein the radio frequency tag includes a sensor.

118. The apparatus of claim 117, wherein the sensor characterizes at least one member selected from the group consisting of ionizing radiation, chemical moieties, biological species, acoustic emission, mechanical vibration and actinic radiation.

119. The apparatus of claim 117, wherein the sensor characterizes at least one member selected from the group consisting of electromagnetic radiation, humidity, temperature, vibration, acceleration and mechanical interlock.

120. The apparatus of claim 116, further comprising a sensor coupled to the radio frequency tag.

121. The apparatus of claim 120, wherein the sensor characterizes at least one member selected from the group consisting of ionizing radiation, chemical moieties, biological species, acoustic emission, mechanical vibration and actinic radiation.

122. The apparatus of claim 120, wherein the sensor characterizes at least one member selected from the group consisting of electromagnetic radiation, humidity, temperature, vibration, acceleration and mechanical interlock.

123. The apparatus of claim 120, wherein the sensor includes a power source that is not necessary for the tag to transmit identification data and location data.

124. The apparatus of claim 123, wherein the power source includes an energy storage device that is recharged by at least one current source selected from the group consisting of a photovoltaic, a vibrational transducer, an electrostatic charger, a radio frequency power rectifier, a thermo-electric generator and a radioisotope decay energy recovery device.

125. The apparatus of claim 120, wherein the sensor is coupled to the radio frequency tag wirelessly by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

126. The apparatus of claim 125, wherein identification data and location data from the radio frequency tag is transmitted within a first frequency band and the sensor is coupled to the radio frequency tag wirelessly within a second frequency band that does not overlap the first frequency band.

127. The apparatus of claim 114, wherein the radio frequency tag is coupled to a shipping container.

128. The apparatus of claim 127, wherein the radio frequency tag transmits environmental state data using hybrid spread-spectrum modulation

129. The apparatus of claim 128, wherein environmental state sensor data includes an environmental state inside the shipping container.

130. The apparatus of claim 127, further comprising an antenna coupled to the shipping container.

131. The apparatus of claim 127, wherein the shipping container includes a shipping container power supply and the radio frequency tag can tap into the shipping container power supply.

132. The apparatus of claim 131, wherein the shipping container includes one member selected from the group consisting of a dry box and a reefer.

133. The apparatus of claim 114, further comprising a reader wirelessly coupled to the radio frequency tag, the reader receiving identification data and location data from the radio frequency tag and re-transmitting identification data and location data from the reader to a site server that provides data accumulation and analysis.

134. The apparatus of claim 133, wherein transmitting identification data and location data from the radio frequency tag occurs within a first frequency band and re-transmitting identification data and location data from the reader to the site server occurs within a second frequency band that does not overlap the first frequency band.

135. The apparatus of claim 134, wherein re-transmitting identification data and location data from the reader to the site server can include wireless transmission by at least two alternatives selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

136. The apparatus of claim 133, wherein the reader is electrically coupled to the site server via a reader power supply line and re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes transmission on the reader power supply line

137. The apparatus of claim 136, wherein re-transmitting identification data and location data from the reader to the site server includes transmission by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

138. The apparatus of claim 136, wherein re-transmitting identification data and location data from the reader to the site server includes rejecting noise at a frequency selected from the group consisting of approximately 50 Hz and approximately 60 Hz and substantially all harmonics thereof and diversifying.

139. The apparatus of claim 133, wherein re-transmitting identification data, location data and environmental state sensor data from the reader to the site server includes wireless transmission by at least one member selected from the group consisting of hybrid spread-spectrum, direct sequence spread-spectrum, frequency hopping, time hopping, time division multiplexing, orthogonal frequency division multiplexing and infrared.

140. The apparatus of claim 140, wherein wireless transmission by hybrid spread-spectrum modulation includes rejecting noise at a frequency selected from the group consisting of approximately 50 Hz and approximately 60 Hz and substantially all harmonics thereof and diversifying.

141. The apparatus of claim 133, further comprising a site server wirelessly coupled to the reader, the site server receiving identification data and location data from the reader and re-transmitting identification data and location data and environmental state sensor data from the site server to at least one servèr of a common database that provides analysis, comparison and tracking.

142. The apparatus of claim 141, wherein the common database defines a global database.

143. The apparatus of claim 141, wherein re-transmitting identification data and location data from the site server to the common database can include transmission by at least two

alternatives selected from the group consisting of satellite, cellphone, acoustic, power line, telephone line, coaxial line, optical fiber and optical cable.

144. The apparatus of claim 141, wherein re-transmitting identification data, location data and environmental state sensor data from the site server to the common database includes transmission by internet.

145. A vehicle, comprising the apparatus of claim 114.

146. A port area network, comprising the apparatus of claim 114.

147. A regional area network, comprising the apparatus of claim 114.

148. A national area network, comprising the apparatus of claim 114.

149. A global area network, comprising the apparatus of claim 114.